THE EFFECT OF SELECTED NUTRIENTS ON REPRODUCTIVE PHYSIOLOGY OF SCALED AND BOBWHITE QUAIL: PHASE II—DIETARY STUDIES WITH SCALED QUAIL

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FINAL PROGRESS REPORT

A series of experiments was conducted in Spring 1981 to establish the daily consumption of calories necessary to maintain the body weight of adult scaled quail (Callipepla squamata) exposed to a variety of dietary and temperature conditions. These data are necessary to establish baseline values for the nutritional requirements of this species. The long range project is designed to examine nutritional-environmental influences on quail reproductive success in West Texas.

The initial experiment was to determine if scaled quail will alter their feed consumption in response to the caloric content of their diet. Quail were housed in an environmental chamber maintained at 26°C to eliminate the influence of temperature changes. Five replicate pens of 5 males were fed a 16% protein, 4200 Kcal/Kg diet to establish consumption levels. Thereafter their diets were diluted with 10%, 20% and 30% sand sequentially at fortnightly intervals. The first week of each dietary treatment was allowed for acclimation and measurements were taken during the second week. Mean metabolic efficiency and feed consumption were 82% and 7.9 gms/bird/day respectively and caloric consumption averaged 21.3 Kcal/bird/day under controlled conditions. As their diet was diluted with sand, scaled quail increased feed consumption only slightly (Fig. 1), but became more selective in dietary choice. These diets were not pelleted so birds were apparently able to choose feedstuffs high in calories. Feed left in the feeders was

significantly lower in calorie value than feed presented. Overconsumption of calories occurred when the feed given contained more than 20% sand (Table 1) and body weights increased about 5% (Fig. 1).

Another experiment was conducted to determine the relationship between environmental temperature and dietary intake of scaled quail. Five replicate pens of 5 males and an equal number of pens with 5 females each were housed in an environmental chamber and fed a 16% protein, 4200 Kcal/Kg diet. These quail had been acclimated to cool winter-early spring temperatures prior to this experiment. They were subjected to 5 two-week duration temperature trials consisting of 10°, 20°, 30°, 40° and back to 20°C. The first week was allowed for adaptation and measurements were taken during the second week at each temperature.

Feed consumption of both males and females decreased significantly ($P<.05$) as temperature increased (Fig. 2), although body weights decreased only at 40°C (Fig. 3). Over consumption was observed when quail were returned to 20°C, apparently to compensate for weight loss at 40°C. Metabolic efficiency (calories consumed minus calories excreted) was not affected by temperature changes and no differences between males and females were seen, Table 2. The metabolic energy balance of nonbreeding adult male and female scaled quail did not differ significantly ($P<.05$) even though males weighed more than females. Metabolizable calorie consumption was linearly related to environmental temperature over the range measured, Fig. 4.

These two experiments demonstrate that the nutritional requirements of scaled quail are dependent on temperature and on nutrient density and that these quail alter their dietary consumption to maintain a relatively constant energy balance. The implications are that in cool spring weather or times of low dietary quailty, a negative energy balance may not favor high reproductive success.

Finally, a series of photographs of scaled quail chicks were taken at weekly intervals from 1 day of age through 15 weeks at which time they became grossly indistinguishable from adults. The quail chicks were standing beside a taxidermy mounted adult hen for size comparison. Descriptive information of feather color pattern, body weight, leg length, wing length and growing primary feather length were recorded for additional aging measurements of captive birds. The primary purpose of this study was to develop a field guide for aging scaled quail from observations of non-captive broods. The field guide for blue quail is currently in final manuscript preparation form and will be available for use this spring. A similar guide for bobwhite chicks is not complete at this time because photos of some ages were not suitable due to cannibalism in the growing pens. The bobwhite series will be finished during 1982 when chicks hatch and can be photographed.

Table 1. Mean Calorie Consumption, Metabolic Efficiency and Calories Metabolized by Scaled Quail Fed Sand Diluted Diets

Dietary Sand	Calories Consumed (Kcal/bird/day)	Metabolic Efficiency (%)	Calories Metabolized (Kcal/bird/day)
0%	26.1^{a}	81.6^{ab}	21.3^{a}
10%	26.3^{a}	80.1^{a}	21.0^{a}
20%	31.2^{b}	82.1^{ab}	25.6^{d}
30%	34.4^{c}	83.2^{b}	28.7^{de}

Table 2. Metabolized Energy Consumption By Male and Female Scaled Quail at Different Temperatures

	Metab. Efficiency (Percent)		ME Consumption (Kcal/bird/day)	
	Males	Females	Males	Females
10°C	83.5[a]	83.1[a]	41.3[a]	41.7[a]
20°C	81.9[a]	83.2[a]	30.8[b]	32.1[b]
30°C	81.6[a]	82.5[a]	24.4[c]	25.1[c]
40°C	81.7[a]	82.4[a]	18.8[d]	19.7[d]

Figure 1

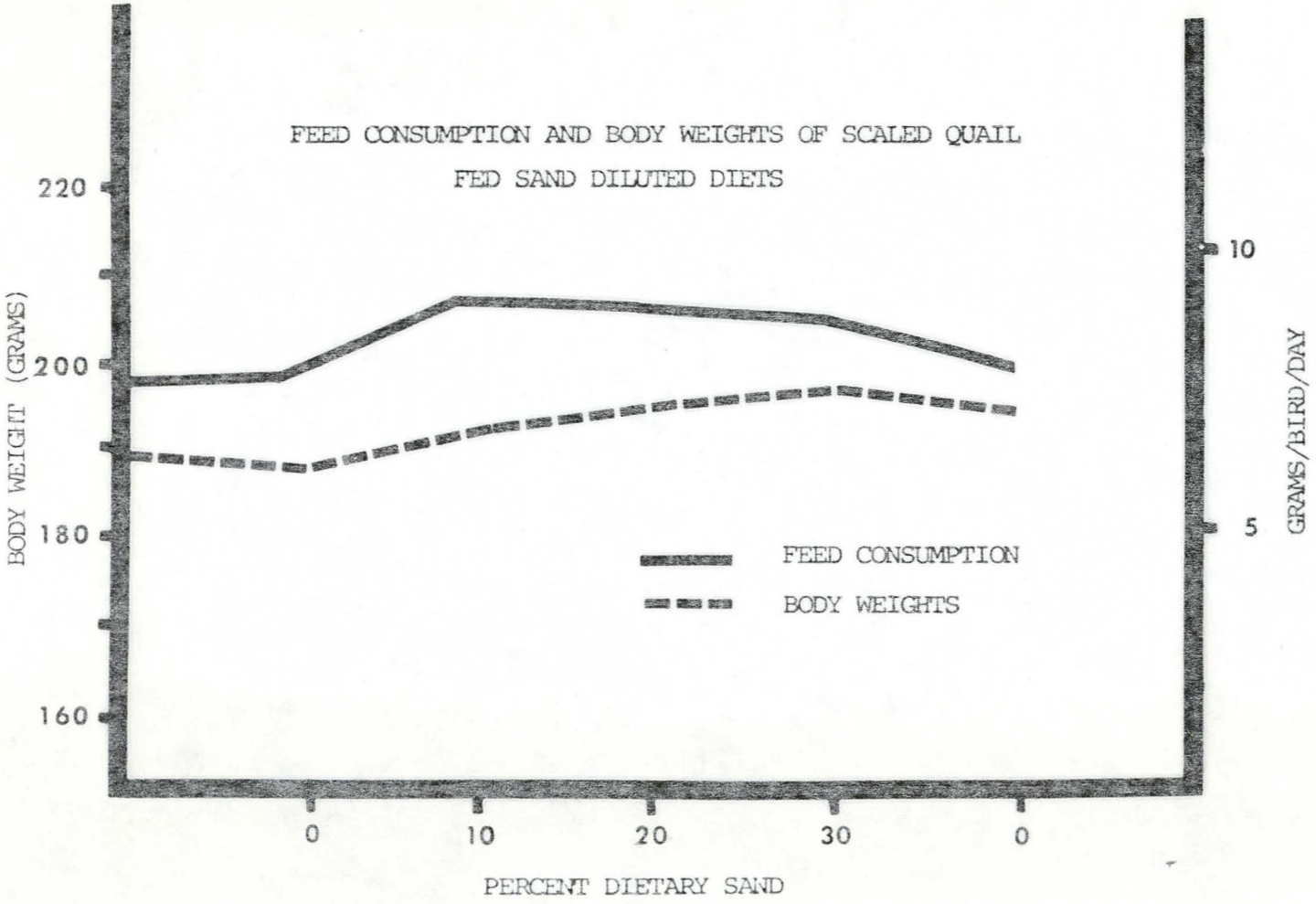

FEED CONSUMPTION AND BODY WEIGHTS OF SCALED QUAIL
FED SAND DILUTED DIETS
220
200
180
160
BODY WEIGHT (GRAMS)
10
5
GRAMS/BIRD/DAY
FEED CONSUMPTION
BODY WEIGHTS
0
10
20
30
0
PERCENT DIETARY SAND

Figure 2

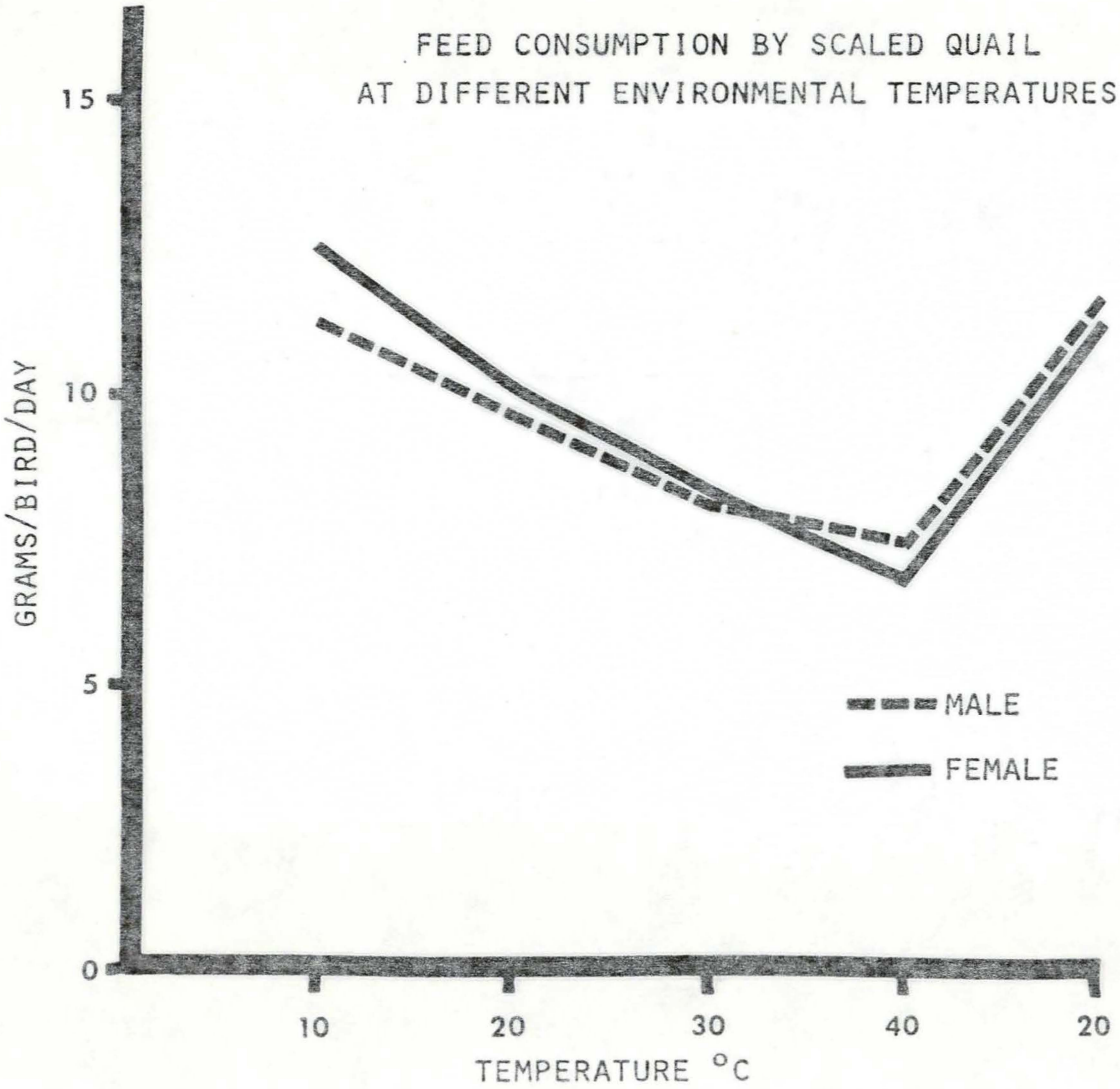

FEED CONSUMPTION BY SCALED QUAIL
AT DIFFERENT ENVIRONMENTAL TEMPERATURES
GRAMS/BIRD/DAY
15
10
5
0
MALE
FEMALE
10
20
30
40
20
TEMPERATURE °C

Figure 3

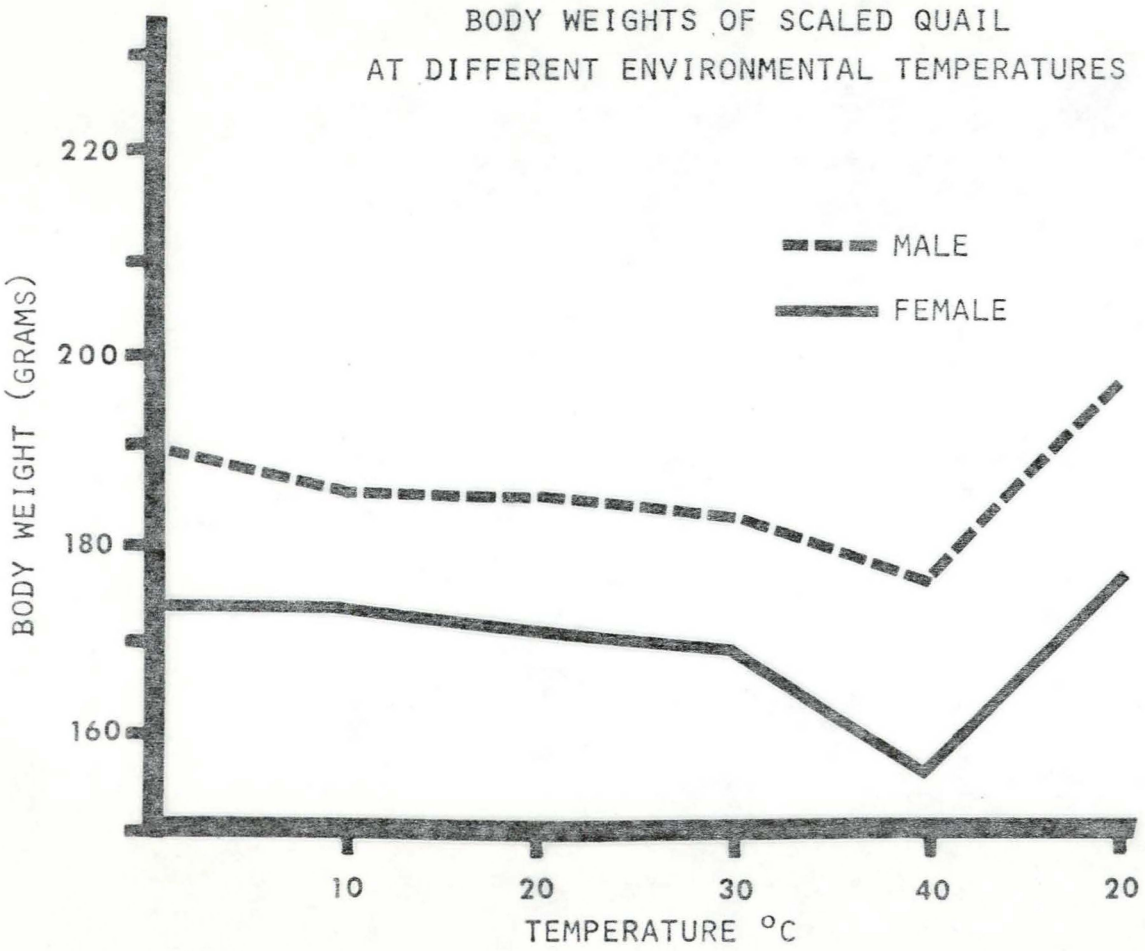
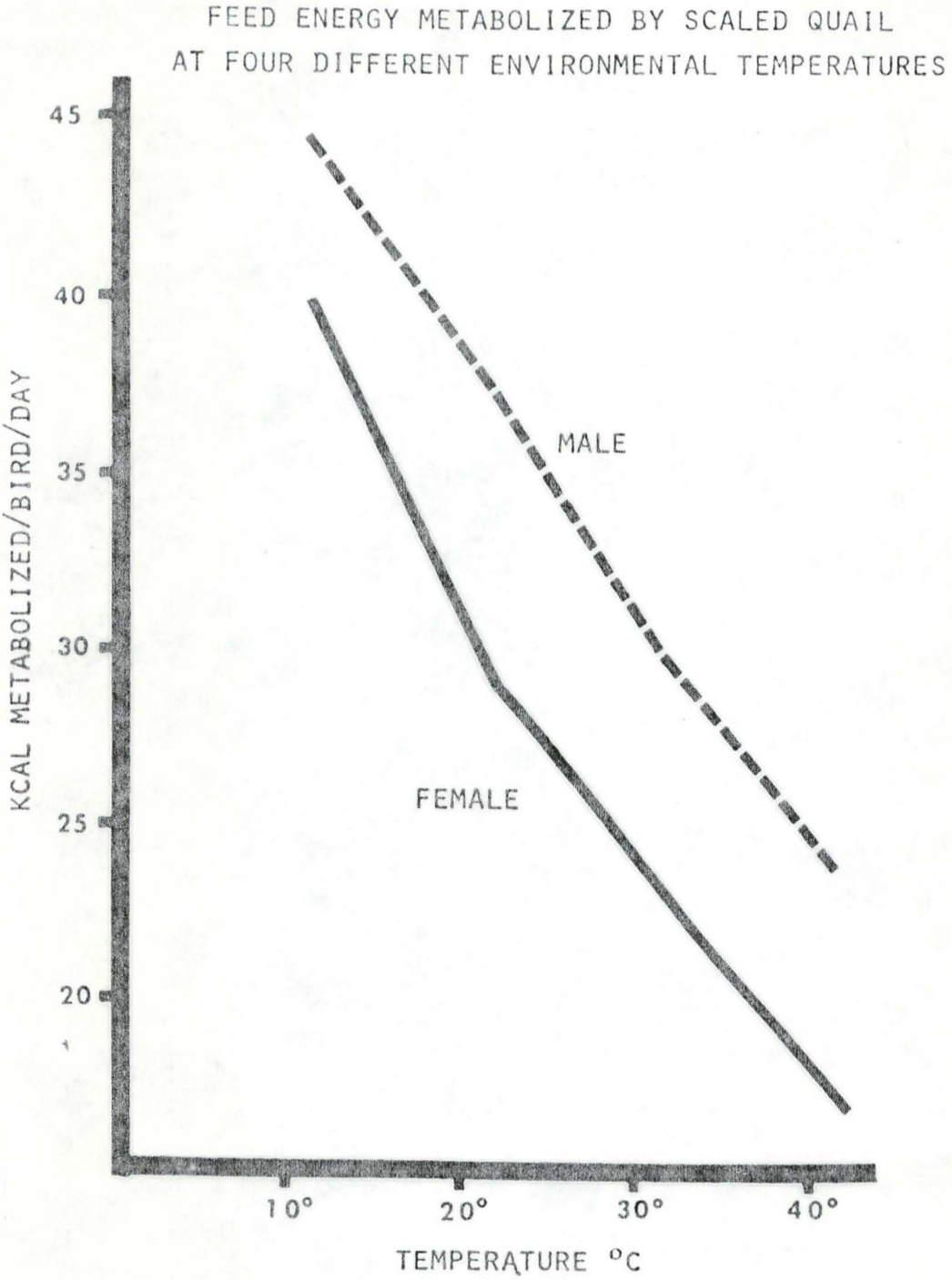

BODY WEIGHTS OF SCALED QUAIL
AT DIFFERENT ENVIRONMENTAL TEMPERATURES
MALE
FEMALE
BODY WEIGHT (GRAMS)
220
200
180
160
10
20
30
40
20
TEMPERATURE °C

Figure 4


FEED ENERGY METABOLIZED BY SCALED QUAIL
AT FOUR DIFFERENT ENVIRONMENTAL TEMPERATURES
KCAL METABOLIZED/BIRD/DAY
45
40
35
30
25
20
MALE
FEMALE
10°
20°
30°
40°
TEMPERATURE °C